from the ſcarlet eruption; and the paſſage from the back of the fauces into the ear having lain open expoſed to its malign influence, an abſceſs has been formed in the tympanum, which has been deſtroyed; otherwiſe the bones could not come out at the other ear."

He had learned to read before this unhappy accident, and the people about him write down what they want to make him underſtand; at leaſt at preſent, till they have found out a readier method.

LI. *Obſervations concerning the Body of his late Majeſty*, October 26, 1760, *by* Frank Nicholls, *M. D. F. R. S. Phyſician to his late Majeſty.*

To the Right Honourable George *Earl of* Macclesfield, *Preſident of the Royal Society.*

My Lord,

Read Nov. 26, 1761.

THE incloſed papers have been laid before the Lord Chamberlain, for his Majeſty's inſpection; and his Majeſty's anſwer was, That he ſaw no reaſon, why they may not be made public.

The burſting the ventricle of the heart is a caſe entirely unknown in phyſical writers; and muſt depend on many circumſtances, which rarely coincide.

I have uſed my beſt endeavours, to give a clear and ſatisfactory account of this very extraordinary affair; and I hope I have ſucceeded: but, if any thing

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thing abſtruſe ſhould appear, I truſt, it will be attributed rather to the nature of the caſe, than to any want of conſideration or reſpect for your Lordſhip, or the Society, in,

My Lord,
Your Lordſhip's
moſt obedient,
and moſt humble ſervant,

October 20, 1761.

Fran. Nicholls.

To the Right Honourable the Earl of Macclesfield, *Preſident of the Royal Society.*

My Lord,

THE circumſtances attending the death of the late King being ſuch, as are not (I apprehend) to be met with in any of the records of phyſical caſes, and ſuch, as, from the nature of the parts concerned, are not eaſily to be accounted for; I preſume it will be agreeable to your Lordſhip, to the Society in which you preſide, and to the learned world in general, if I lay before your Lordſhip, and the Society, a minute detail of what occurred on that remarkable and melancholy occaſion; with ſuch explanations, as ariſe from the circumſtances of the caſe.

According to the report of the pages then in waiting, about ſeven in the morning, Saturday, October 25th, a noiſe was ſomewhere heard, as if a large billet had tumbled down; and, upon enquiry, his

Majeſty was found fallen on the ground, ſpeechleſs and motionleſs, with a ſlight contuſed wound on his right temple. He appeared to have juſt come from his neceſſary-ſtool, and as if going to open his eſcritoir. Mr. Andrews (at that time ſurgeon to the houſhold) attempted to take away ſome blood; but in vain, as no ſigns of ſenſe, or motion, were obſerved, from the time of his fall.

The next day, (Sunday, October the 26th) by order of the Lord Chamberlain, I attended, with the two ſerjeant-ſurgeons, who were directed to open and embalm the Royal Body.

On opening the abdomen, all the parts therein contained were found in a natural and healthy ſtate, except that ſome hydatides (or watery bladders) were found between the ſubſtance of each kidney, and its internal coat. Theſe hydatides might, in time, have proved fatal, either by compreſſing and deſtroying the kidnies, ſo as to bring on an incurable ſuppreſſion of urine; or, by diſcharging a lymph into the cavity of the abdomen, might have formed a dropſy, not to be removed by any medicines: but, in the preſent caſe, theſe hydatides were of no conſequence, as none of them exceeded the bulk of a common walnut.

On opening the head, the brain was found in a healthy ſtate, no-ways loaded with blood, either in its proper veſſels, or in the contiguous ſinuſes of the dura mater.

Upon opening the cheſt, the lungs were in a natural ſtate, free from every appearance of inflammation, or tubercle: but upon examining the heart, its pericardium was found diſtended, with a quantity of coagulated blood, nearly ſufficient to fill a pint cup;

and, upon removing this blood, a round orifice appeared in the middle of the upper ſide of the right ventricle of the heart, large enough to admit the extremity of the little finger. Through this orifice, all the blood brought to the right ventricle had been diſcharged into the cavity of the pericardium; and, by that extravaſated blood, confined between the heart and pericardium, the whole heart was very ſoon neceſſarily ſo compreſſed, as to prevent any blood contained in the veins from being forced into the auricles; which, therefore, with the ventricles, were found abſolutely void of blood, either in a fluid or coagulated ſtate.

As, therefore, no blood could be tranſmitted through the heart, from the inſtant that the extravaſation was completed, ſo the heart could deliver none to the brain; and, in conſequence, all the animal and vital motions, as they depend on the circulation of the blood through the brain, muſt neceſſarily have been ſtopped, from the ſame inſtant; and his Majeſty muſt, therefore, have dropped down, and died inſtantaneouſly: And as the heart is inſenſible of acute and circumſcribed pain, his death muſt have been attended with as little of that diſtreſs, which uſually accompanies the ſeparation of the ſoul and body, as was poſſible, under any circumſtances whatſoever.

The above-mentioned appearances (as they ſhewed the immediate cauſe of his Majeſty's death) were thought ſufficient to form the report to his preſent Majeſty, and his Council. But as the very eminent and amiable character of his late Majeſty muſt make the nature of his death the object of every one's attention and inquiry; and as the caſe was exceedingly

ſingular

ſingular and extraordinary in itſelf; and as the heart muſt have been merely paſſive, and, conſequently, there muſt have been ſome other concurrent circumſtances neceſſary to produce ſuch an effect; I judged, at the time, when the report was drawn, that a more minute and exact detail would not only be expected by the world, but would be highly proper, as our inquiry furniſhed ſufficient matter.

Two queſtions naturally ariſe upon the face of our report; viz. by what means the right ſide of the heart became ſo charged with blood, as to be under a neceſſity of burſting? and how it could happen, that, as the ventricle (when under great diſtenſions) generally makes one continued cavity with the auricle, and is much thicker and ſtronger than the auricle, the blood ſhould, nevertheleſs, force its way, by burſting the ventricle, rather than the auricle, ſeemingly in contradiction to the known property of fluids, to force their way, where the reſiſtance is leaſt?

Upon examining the parts, we found the two great arteries, (the aorta and pulmonary artery, as far as they are contained within the pericardium) and the right ventricle of the heart ſtretched beyond their natural ſtate; and, in the trunk of the aorta, we found a tranſverſe fiſſure on its inner ſide, about an inch and half long, through which ſome blood had recently paſſed, under its external coat, and formed an elevated echymoſis. This appearance ſhewed the true ſtate of an incipient aneuriſm of the aorta; and confirmed the doctrine, which I had the honour to illuſtrate, by an experiment, to the ſatisfaction of the Society, in the Year 1728; [See the Philoſophical Tranſactions, N° 402.] viz. that the external coat of the artery may (and does) often controul an impetus of the blood, capable of burſting the internal (or ligamentous, coat; although this laſt is by much the thickeſt, and, ſeemingly, the ſtrongeſt.

In regard to this diſtention of the aorta; as his Majeſty had, for ſome years, complained of frequent diſtreſſes and ſinkings about the region of the heart; and as his pulſe was, of late years, obſerved to fall very much upon bleeding; it is not doubted, but that this diſtenſion of the aorta had been of long ſtanding, at leaſt to ſome degree; and, as the pulmonary artery was thereby neceſſarily compreſſed, and a reſiſtance, greater than natural, thereby oppoſed to the blood's diſcharge out of the right ventricle, it is reaſonable to conclude, that a diſtenſion and conſequent weakneſs of the pulmonary artery and right ventricle, to ſome degree, were nearly coeval with that of the aorta. But that the aorta had ſuffered a more extraordinary and violent diſtenſion, immediately antecedent to the burſting of the ventricle, is evident, from the recent fiſſure of the aorta, and the conſequent extravaſation of blood between its coats. Now, as this increaſed and violent diſtenſion of the aorta muſt have been attended with a proportionate preſſure upon the pulmonary artery, and, conſequently, an increaſed oppoſition to the paſſage of the blood out of the right ventricle; ſo that diſtenſion of the aorta muſt be conſidered, as the immediate cauſe of the right ventricle's being ſurcharged with blood, and conſequently of its burſting.

The immediate cauſe of this diſtenſion of the aorta, as likewiſe of its being determined to that particular time, are naturally explicable, from his Majeſty's having

having been at the neceſſary-ſtool; as the office then required cannot be executed, but by ſuch a preſſure on all the contents of the lower belly, and, conſequently, on the great deſcending artery, as muſt, of neceſſity, ſubject the trunk of the aorta, and all its upper branches, to a ſurcharge with blood continually increaſing, in proportion as the preſſure may happen to be continued longer, or exerted with greater violence, in conſequence of a coſtive habit, or any other reſiſtance.

As to the ſecond queſtion; viz. how it could happen, that the blood ſhould force its way rather through the ſide of the ventricle than of the auricle? ſince it is well known, that when the ventricle is fully diſtended with fluids, they will eaſily paſs back into the auricle; ſo that under ſuch a diſtenſion, as the ventricle muſt have ſuffered, before it burſt, it ſhould ſeem to have made one continued cavity with the auricle; of which cavity, the auricle, being by much the weakeſt part, muſt have been the moſt liable to a rupture. This certainly is the circumſtance, in which the very great ſingularity of the caſe before us conſiſts; and many difficulties offer againſt any obvious explanation.

Two circumſtances, however, ſeem to throw ſome light on this obſcure and difficult queſtion. The firſt conſiſts in the texture, connexions, and capacity, of the pericardium; the ſecond, in the order, in which the ſeveral ſurcharges muſt have ariſen.

The pericardium is a ſtrong tendinous membrane, inelaſtic in every direction, containing the two auricles, the two ventricles, and the two great arteries, as in a purſe: it is fixed to its contents at the back of the two auricles, where, by its connexion, it ſurrounds the two venæ cavæ: hence, paſſing along the arch formed by the aorta, it deſcends to the pulmonary artery, and continues round the orifices of the pulmonary veins, firmly attached to theſe ſeveral parts in its paſſage. By theſe connexions, theſe parts are all fixed in their ſeveral ſtations, incapable of ſeparating from each other, or ſhifting their ſituations, however they may happen to be compreſſed. The pericardium is generally ſaid to ſerve as a defence to the heart; but that defence ſeems to conſiſt chiefly, in preventing the right auricle from being ſtretched by the depreſſions (or complanations) of the diaphragm, in hunger and inſpiration, and, by its bearing firmly againſt the ſides of the auricles, to ſupport and ſtrengthen them againſt too great diſtenſions: for the cavity of the pericardium ſeems to be but little more, than commenſurate to the bulk of its contents, when one half of them are filled, and the other half empty. This will appear, upon endeavouring to fill the heart, with its auricles, and its two great arteries, with wax, at the ſame time, while it is incloſed in the pericardium; in which experiment, one or other of theſe cavities will be found to have been ſo compreſſed by the pericardium, as to have refuſed a free admittance to the wax, and will, therefore, be found proportionally empty.

The inelaſtic texture, connexions, and capacity, of the pericardium, being thus ſtated, let us now conſider the order, in which the ſeveral diſtenſions muſt have ariſen, in the two great arteries and cavities of the heart, with the neceſſary effects of thoſe diſtenſions on the pericardium, and the parts which it contains.

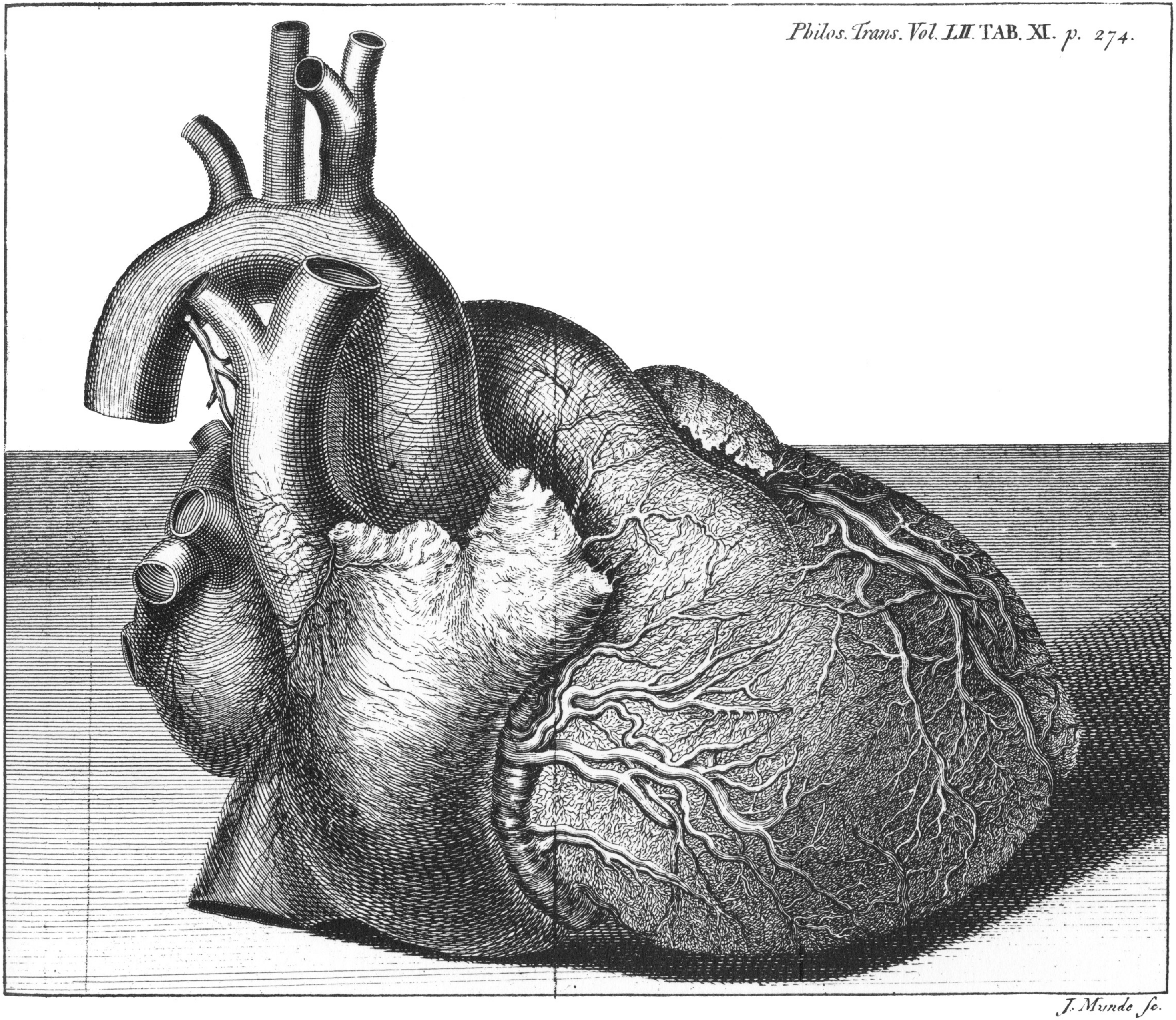
The firſt diſtenſion (and this a great and violent one) muſt have ariſen in the aorta; and the conſequent preſſure on the pulmonary artery (by the aorta ſo diſtended) muſt have been ſufficient (either by degrees or at once) to ſtop the blood's diſcharge out of the right ventricle and pulmonary artery, and to diſtend both thoſe cavities greatly beyond their natural ſtate of repletion. So that, under theſe circumſtances, the two great arteries, and the right ventricle, muſt have been under an extraordinary and continued diſtenſion (and, conſequently, an increaſe of bulk) at the ſame time; whereas, in the natural ſtate of the body, theſe three cavities are alternately dilated and contracted, and the right ventricle is always proportionally diminiſhed in bulk, as the pulmonary artery is increaſed, and vice verſâ. So that, with reſpect to theſe three great cavities, (ſuppoſing that their ſeveral diſtenſions had been no greater than natural) the pericardium muſt have been obliged to contain one third more in proportion, than its capacity was formed to receive. During this time, the blood being ſtopped in its paſſage through the lungs, and its afflux to the left auricle and ventricle being thereby ſuſpended, the left auricle and ventricle muſt have remained in a contracted ſtate; in conſequence of which, the right ventricle had ample ſpace in the pericardium, to admit that degree of diſtenſion, which was previouſly requiſite for its burſting. But the right auricle (being fixed to its ſtation by its connections with the left auricle and the pericardium, and being firmly compreſſed againſt

againſt the pericardium, by the aorta, the pulmonary artery, and the right ventricle, all which appear to have been, at this time, greatly diſtended beyond their natural bulk) muſt have been thereby deprived of the ſpace in the pericardium, neceſſary to admit of its being diſtended; and the whole ſurcharge and diſtenſion muſt, by the preſſure of the pericardium on the auricle, neceſſarily have been confined to the right ventricle, till it burſt.

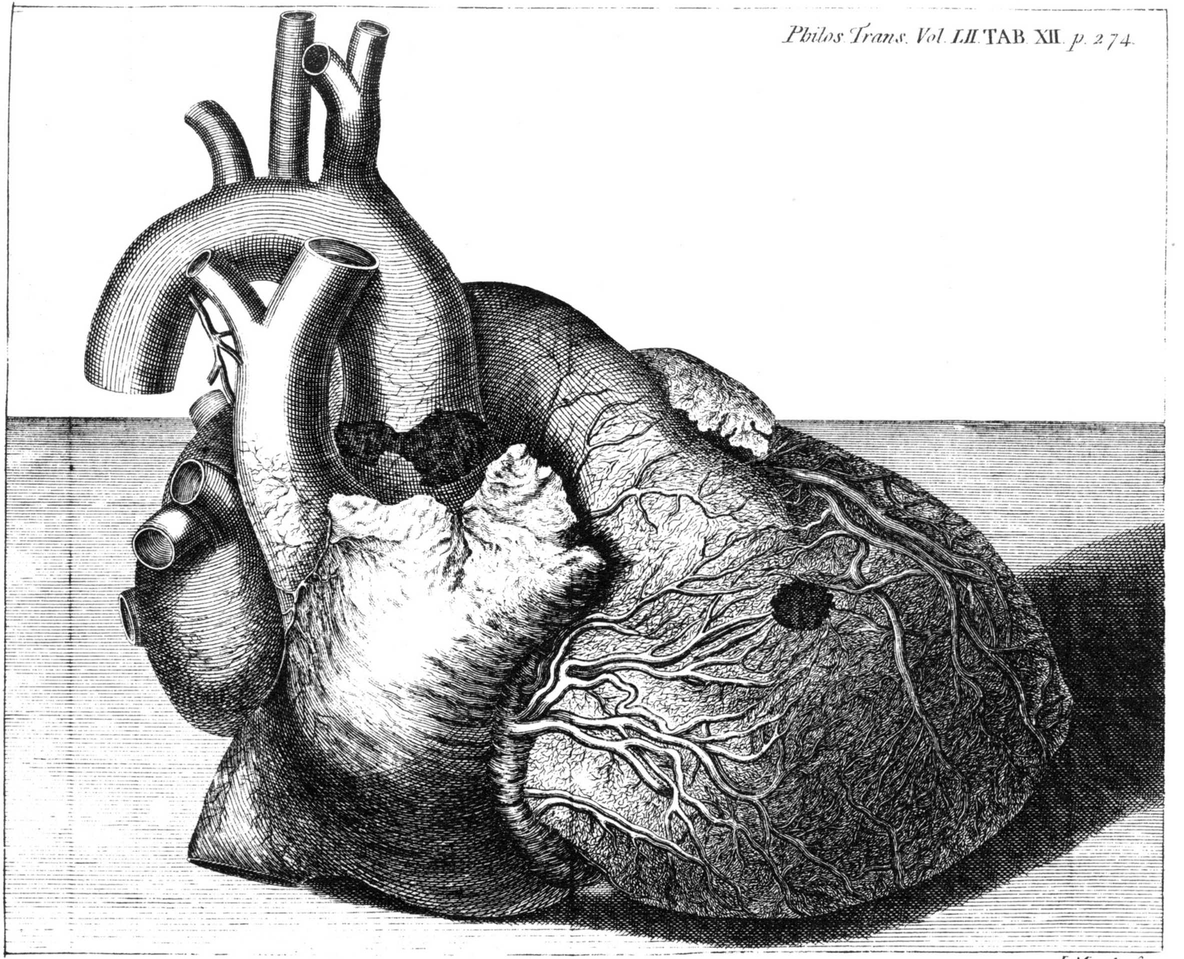
Had theſe ſurcharges ariſen in any other order, their effects muſt have been greatly different: as for inſtance, if the ſurcharge in the right ventricle had ariſen from any other preſſure, than from a diſtenſion of the aorta, the extraordinary bulk of the aorta, and its preſſure againſt the pulmonary artery, would not have exiſted, and the right auricle, not being then compreſſed againſt the pericardium, would have been at liberty to diſtend, till the blood had made its way through its ſides.

In confirmation of this power, here attributed to the pericardium, of ſtrengthening and ſupporting its contained parts, let it be obſerved, that, in the caſe under conſideration, the place of the fiſſure in the aorta is preciſely where the preſſure of the pericardium is kept off from the aorta, to a conſiderable degree, by the ſituation of the right auricle and the pulmonary artery.

My Lord, in order to give a clear and diſtinct idea of this very extraordinary caſe, I have here annexed two prints; [*Vide Tab.* XI. & XII.] the firſt of which ſhews the heart, as it appears when all its cavities and blood-veſſels are filled with wax; the other is the ſame print, having the orifice in the right ventricle, Philos. Trans. Vol. LII. TAB. XI. p. 274.



J. Mynde Sc.



J. Mynde sc.

ventricle, and the extravaſation covering the fiſſure in the aorta, exactly marked, as they appeared to,

My Lord,
Your Lordſhip's
moſt obedient
and moſt humble ſervant,

Frank Nicholls.

LII. *Of the Irregularities in the planetary Motions, cauſed by the mutual Attraction of the Planets: In a Letter to* Charles Morton, *M. D. Secretary to the Royal Society, by* Charles Walmeſley, *F. R. S. and Member of the Royal Academy of Sciences at* Berlin, *and of the Inſtitute at* Bologna.

S I R,

Read Dec. 10, 1761.

FInding that the influence, which the primary planets have upon one another, to diſturb mutually their motions, had been but little conſidered, I thought it a ſubject worthy of examination. The force of the ſun, to diſturb the moon's motion, flows from the general principle of *gravitation*, and has been fully aſcertained, both by theory and obſervation; and it follows, from the

ſame